Citation:

Sullivan DH, Liu L, Roberson PK, Bopp MM, Rees JC. Body weight change and mortality in a cohort of elderly patients recently discharged from the hospital. *J Am Geriatr Soc.* 2004 Oct;52(10):1696-701.

PubMed ID: 15450047

Study Design:

Prospective Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To evaluate the prognostic significance of weight change in frail elderly patients.

Inclusion Criteria:

Patients aged 65 and older admitted to a general medical or surgical ward of the Department of Veterans Affairs (VA) Hospital in Little Rock, Arkansas, were screened at admission to determine study eligibility.

Exclusion Criteria:

Patients with metastatic cancer and those receiving palliative care for other terminal conditions were excluded.

Description of Study Protocol:

Recruitment

Patients who met study entry criteria were assigned a computer-generated random number (from 0 to 9). Eligible patients were selected for study entry based on this random number. Initially, only the patients assigned a number less than 2 were asked to enter the study to maintain an enrollment rate of four to five subjects per week. Subjects were tracked after discharge via telephone until December 1, 2000.

Design: Prospective cohort study

Each subject's medical record was reviewed to document weights recorded at any hospital or clinic visit within the prior year. While participants were in the study, all weights measured during the hospitalization or after discharge were also recorded. Subjects who were VA patients agreed to review of prior and future medical records containing weight history data as part of the consent process. Subjects who received primary care outside of the VA signed for release of records from their physicians to obtain weights recorded at these outside office visits. For the times when subjects were hospitalized, only weights obtained while the subject appeared to be euvolemic were recorded. Only the first and the last of these euvolemic weights recorded during each admission were retained (and were assumed to represent the hospital admission and the hospital discharge weight,

respectively). Subjects were not considered to be reliable sources of information regarding their own weights.

Subjects were considered to be current smokers if they had smoked one or more packs of cigarettes per week within the 3 months before admission.Confirmation of smoking status was based on subject query and medical record review. A diagnosis of alcohol abuse was taken from the medical record and was defined as health or social problems resulting from excess alcohol consumption within the 5 years before admission. Functional status (assessed using the Katz index of activities of daily living (ADL) scale), cognitive status (assessed using Mini-Mental State Examination score), Acute Physiology and Chronic Health Evaluation (APACHE) II score, the Charlson Weighted Index of Comorbidity, and the Chronic Disease Score were included as indicators of illness severity. The Chronic Disease Score was set equal to the number of diagnoses (0–7) the subject had from the following chronic disease categories: congestive heart failure, diabetes mellitus, cerebrovascular accident (CVA) dementia Alzheimer's or multiinfarct), Parkinson's disease, chronic obstructive pulmonary disease, and end-stage renal failure

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

- Two methods were used to evaluate intraindividual weight change during the period of observation.
- First, least-squares regression was used to estimate the average change (i.e., slope of change) in each individual's weight over time.
- All of the weights available for each subject, beginning with the first weight obtained in the year before study admission to the last weight obtained before December 1, 2000, were entered into the analysis.
- The regression coefficient (i.e., slope) was then used to represent the individual's weight change (kg/y) over time.
- Second, the amount of variability in each subject's weight was determined using the coefficient of variation (CV).[24] The CV (expressed as a percentage) is defined as the standard deviation (SD) of all weights for an individual divided by the individual's mean weight.
- The differences in demographic factors, substance abuse history, BMI, and illness severity at hospital discharge between survivors and decedents were examined using Cox proportional hazards regression analyses.

.

Data Collection Summary:

Timing of Measurements

The standard diagnostic evaluation was completed within 48 hours of admission. This evaluation was also completed at discharge. Each subject's weight was obtained from previous hospital or clinic visits within the prior year. The median number of weights per subject was 14 (IQR58–20 weights). Subjects had at least three weights recorded in total and at least one weight recorded every year for an average of 3.6 ±1.6 years before their death or last follow-up.

Dependent Variables

- Mortality

Independent Variables

- Weight change

Control Variables

- Demographic characteristics
- Substance abuse history (alcohol and tobacco use)
- Body mass index
- Illness severity indices

Description of Actual Data Sample:

Initial N: 678

Attrition (final N): 660 (98% male)

Age: 74 ± 6 years (average ± standard deviation)

Ethnicity: 85% white

Other relevant demographics: >73 % of subjects had a chronic disease score > 1

Anthropometrics

Location:

VA Hospital, Little Rock, Arkansas

Summary of Results:

Key Findings

- During the study, 314 subjects (48%) died.
- Subjects who were relatively weight stable < 1 kg/year had the lowest mortality (weight change of 28%).
- With this group as referent, a U-shaped pattern emerged when the relative risk of death for each of the weight change groups was compared.
- The relative risk of death associated with an average weight gain of 3 or more kg/y [3.94, (95% confidence interval (CI) 52.55–6.11)] was of similar magnitude to the risk associated with an average weight loss of 3 or more kg/y [4.63, (95% CI53.39–6.32)].
- These associations remained significant after adjusting for age, race, marital status, and illness severity.

Other Findings

- The relative risk of death associated with a moderate weight gain (1 to < 3kg/yr) was not statistically different from that of the reference group of subjects who were weight stable.
- Weight variability (i.e., CV) was not significantly associated with mortality risk.

Author Conclusion:

In conclusion, for reasons that are not clear, elderly patients who gain an average of 3 or more kg/year after hospital discharge are at nearly the same risk of mortality as those who lose this amount of weight.

Reviewer Comments:

Large sample size, adjusted for coexisting conditions. However, weights came from outside clinics and physicians' offices, so measurements were made on different scales by different staff.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions		
1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A

3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes

6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	No
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	N/A
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	No
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	No
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes

8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes